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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**



APPLICANT: Masaaki Yamanaka et al. **EXAMINER:** Kruer, Kevin R.
SERIAL NO.: 08/855,905 **GROUP ART UNIT:** 1773
FILED: May 14, 1997 **DATED:** October 25, 2004
FOR: SYNTHETIC PAPER MADE OF
STRETCHED POLYPROPYLENE FILM

Mail Stop Appeal Brief-Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450


TRANSMITTAL OF APPELLANTS' BRIEF ON APPEAL

Sir:

Enclosed please find APPELLANT'S BRIEF together with a petition for a two month extension of time, plus Appeal Brief and petition fees.

Please charge any deficiencies or credit any overpayments to Deposit Account No. 04-1121. Also, in the event any additional extensions of time are required, please treat this paper as a petition to extend the time as required and charge Deposit Account No. 04-1121. TWO COPIES OF THIS SHEET ARE ENCLOSED.

Respectfully submitted,

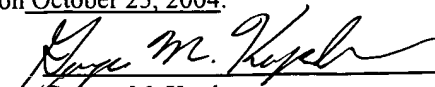

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Dated: October 25, 2004


George M. Kaplan



Attorney Docket: 443-17

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Alexandria, VA 22313-1450

APPELLANTS' BRIEF

Sir:

(1) REAL PARTY IN INTEREST

The real parties in interest are Oji-Yuka Synthetic Paper Co., Ltd. having an office at 3, Kandasurugadai 4-chome, Chiyoda-ku, Tokyo, Japan, and Sanyo Chemical Industries, Ltd., 11-1, Ikkyo Nomoto-cho, Higashiyama-ku, Kyoto-shi, Kyoto, Japan, the assignees of the subject application.

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George M. Kaplan

(2) RELATED APPEALS AND INTERFERENCES

To the best of appellants' knowledge and belief, there are no related appeals or interferences.

(3) STATUS OF CLAIMS

Of Claims 1-49, Claims 2-27 have been cancelled without prejudice.

Claims 1 and 28-49, stand finally rejected and constitute the claims on appeal. A copy of the appealed claims is contained in the Claims Appendix.

(4) STATUS OF AMENDMENTS

There has been no amendment filed subsequent to the final rejection set forth in the Office Action mailed March 23, 2004.

(5) SUMMARY OF THE INVENTION

The appealed claims are directed to synthetic paper made of stretched polypropylene resin film with excellent antistatic properties and offset printability (Claims 1 and 28-49).

As a result of intensive studies made by the present inventors, it has been found that stretching a resin film comprising, as a base material, resin components A, B, C, D and E as described below and oxidizing the stretched film by corona discharge treatment, plasma treatment, or the like, is effective in rapidly imparting antistatic properties to the film and also in improving printing ink adhesion thereon because the stretching and oxidation generate ultrafine cracks in the film matrix and a permanent antistatic agent incorporated

into the film through kneading appears easily on the surface of the film. The claimed synthetic paper is based on this finding. Gloss is maintained in a range of 15-60% and opaqueness in a range of 83-96%.

The claimed synthetic paper having excellent printability includes a film obtained by oxidizing the surface of a film obtained by stretching a resin film comprising as the base material a resin composition including

100 parts by weight of resin components and from 10 to 250 parts by weight of component E: fine inorganic particles;

the resin components comprising, based on the total weight of the resin components;

55-90 wt% of component A: a polypropylene resin,

5-40 wt% of component B: a polyetheresteramide containing aromatic rings

which is derived from

component b1: a polyamide having a number-average molecular weight of from 200 to 5,000 and containing a carboxyl group at each end, and

component b2: an alkylene oxide adduct of bisphenol having a number-average molecular weight of from 300 to 5,000,

3-20 wt% of component C: a polyamide resin, and

1-20 wt% of component D: at least one modified low-molecular weight polypropylene selected from the group consisting of

component d1: an acid-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and an acid value of from 5 to 150,

component d2: a hydroxy-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and a hydroxyl value of from 5 to 150, and

component d3: an ester-modified low-molecular weight polypropylene obtained by partly or wholly esterifying component d1 with a polyoxyalkylene compound and having a number-average molecular weight of from 1,000 to 28,000 (page 5, line 1 - page 6, line 19 of the specification).

The stretching is conducted at a temperature lower than the melting point of the polypropylene resin as component A (independent Claims 1, 28 and 29). Furthermore, the stretching and oxidation of the stretched film generating ultrafine cracks on a surface of the stretched film through which component B as permanent antistatic agent appears (independent Claims 1 and 28, page 4, lines 21-25 and page 21, lines 11-13 of the specification), while the paper possesses gloss of from 15 to 60% and opaqueness of from 83 to 96% (independent Claim 1 and Table 1 on page 37 of the specification).

The stretching of a film of a polypropylene resin comprising, as a base material, resin components A, B, C, D and E as described above orients polypropylene crystals in the polypropylene film matrix. Upon oxidation of the surface of the oriented film by corona discharge treatment, plasma treatment, or the like, the film develops ultrafine cracks on the surface thereof. This facilitates the appearance of the permanent antistatic agent as component B on the film surface to not only rapidly impart antistatic properties to the film, but also improve printing ink adhesion thereon.

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 and 28-49 stand rejected under 35 U.S.C. §103(a) as being obvious over U.S. Pat. No. 4,318,950 to Takashi et al. (hereinafter "Takashi et al.") in view of European Pat. Pub. No. 0 613 919 to Ueda et al. (hereinafter "Ueda et al.") and U.S. Pat. No. 5,233,924 to Ohba et al. (hereinafter "Ohba et al.")

(7) ARGUMENT

- (A) THE COMBINATION OF TAKASHI ET AL. WITH UEDA ET AL. AND OHBA ET AL. FAILS TO SUGGEST THE CLAIMED INVENTION AND ACCOMPANYING SYNERGISTIC ADVANTAGES TO ONE SKILLED IN THE ART.

The present invention is directed to an inventive synthetic paper which possesses not only excellent printability in offset printing or flexography but also excellent antistatic properties as well. Attaining these two properties has often been mutually exclusive. The present invention enables attainment of these two mutually exclusive goals by providing, either as the base material or surface layers upon the base material, the claimed polypropylene resin composition including fine inorganic particles and a film which is stretched and has a surface which is oxidized. The features of the presently claimed invention together with the accompanying advantages attained thereby, are not taught or suggested by the applied references, for the following reasons.

As noted in paragraph 4 of the Office Action mailed November 2, 1988, Takashi et al. fail to teach the claimed polyolefin resin composition capable of imparting antistatic properties. In this regard, Ueda et al. add nothing to the teaching of Takashi et al. which

would at all render obvious the invention claimed herein. More specifically, Ueda et al. do not disclose presence of a composition having antistatic properties in a stretched film, and further do not mention application of the resin composition to offset printing or flexography.

On the other hand, the present invention clearly provides a synthetic paper possessing excellent printability including excellent permanent antistatic properties and offset printability, as documented in the comparative testing outlined in the present application. More specifically, Comparative Examples 1 to 3 document that when a surface layer of a laminated paper composition does not contain the claimed antistatic resin, then ink adhesion property during offset printing is poor although surface resistivity might be good (Comparative Example 1). Alternatively, when the surface layer does not contain inorganic filler, then ink adhesion property at offset printing is poor although surface resistivity might be good (Comparative Example 2). Moreover, when the surface layer is not subjected to stretching then the surface resistivity, ink adhesion and suitability for paper feeding/discharge are all poor (Comparative Example 3). In contrast, the examples of the presently claimed inventive paper laminate exhibit both excellent permanent antistatic properties and offset printability.

In view of the above, it has clearly been documented that only the compositions having the claimed constitution herein will provide both excellent antistatic properties as well as excellent offset printability.

Ohba et al. disclose a synthetic paper having composition and structure remote to the present invention. Accordingly, Ohba et al. add nothing to Takashi et al. and/or Ueda et al. which would render obvious the invention as recited in any pending claim.

(B) IT IS NOT OBVIOUS TO USE THE POLYOLEFIN AND ANTISTATIC COMPOUND OF UEDA ET AL. IN THE PAPER OF TAKASHI ET AL.

In the first Office Action mailed November 2, 1998, it was asserted by the Examiner in paragraph 1 it is obvious to use the polyolefin of Ueda et al in the paper of Takashi et al. This rejection was repeated in the final Office Action mailed May 20, 1999 where it was explicitly stated, in paragraph 9, Takashi et al is relied upon as teaching processing of an antistatic composition into synthetic paper, with Ueda et al relied upon to show a polypropylene composition having improved antistatic properties.

Ueda et al. neither suggest that an antistatic effect-providing olefin resin composition can be oriented to form a film having enhanced antistatic effect nor disclose evaluation of offset printability of synthetic paper made from such antistatic effect-providing olefin composition. An essential feature of the present application involves orienting such an antistatic effect-providing olefin resin composition in admixture with a filler for the purpose of preparing synthetic paper. It had been found that the effect of orienting decreases surface resistivity of the resin composition from 10^{14} to 10^{11} ohm, even if the same high-molecular weight permanent antistatic agent is used, as shown in Comparative Examples 2 and 3 of the present application and documented in Table 2 on page 38 thereof. Thus, the surprising benefit of orienting on antistatic properties has been discovered for the very first time by the present invention.

Takashi et al. concern a synthetic paper obtained by laminating, on both sides of a base layer of biaxially oriented thermoplastic resin, a thermoplastic resin film obtained by uniaxially orienting a thermoplastic resin having an inorganic filler incorporated therein. Takashi et al. disclose incorporation of a low-molecular weight antistatic agent in the paper-

like (surface) layer and base layer. However, the amount of the low-molecular weight agent incorporated is only from 0.1 to 1.0 parts by weight. In the present invention, to the contrary, the amount of high-molecular weight permanent antistatic incorporated is as great as from 5 to 40% by weight based on the weight of the resin component.

As pointed out above, the present invention provides a film processing different constituent and structure from these references and thus provides effect quite different and unexpected from these references.

Furthermore, in the Office Action mailed July 11, 2003, it is stated by the Examiner in the paragraph bridging pages 3-4:

The examiner points out that the rejection does not suggested [sic] that the entire composition of Ueda should be utilized. Rather, the rejection states that it would have been obvious to utilize the anti-static agent taught in Ueda in the composition taught in Takashi [emphasis added].

However, the Examiner is merely picking and choosing selected portions of each reference with no regard to even the slightest suggestion of combining these two references. The only suggestion to prepare the inventive paper is found in the present application itself, which cannot be used to fashion a prior art rejection in hindsight.

Therefore, it cannot be said to be obvious to use the polyolefin and antistatic compound of Ueda et al in the paper of Takashi et al.

(C) IT IS NOT OBVIOUS TO USE THE FILLER AND PROCESSING TAUGHT IN TAKASHI ET AL. WITH THE POLYMER AND ANTISTATIC COMPOUND TAUGHT IN UEDA ET AL.

Ueda et al. disclose an invention relating to a resin composition containing a polymeric antistatic agent (polyetheresteramide); injection molded articles (solid articles)

having improved antistatic properties are disclosed in the examples. Ueda et al. reveal the following.

First, all the moldings disclosed are injection molded articles. There is no description therein concerning the technique according to the present invention in which a sheet formed by extrusion is further stretched to obtain a film. Since the moldings of the invention by Ueda et al. are solid articles (several millimeters) such as injection molded articles and are thicker than the stretched extrudate films according to the present invention (several tens to hundreds of micrometers), crystallization begins from the surface which cools rapidly. As a result, the surface of the molding becomes rich in the polyetheresteramide. Namely the polyamide incorporated in the polyolefin matrix undergoes surface orientation. In contrast, a feature of the present invention is by stretching an extrudate sheet, the polyetheresteramide is oriented in the film surface to provide an improved surface resistivity. This mechanism is completely different from the injection-molded articles of Ueda et al.

Secondly, the injection molded articles obtained by the invention by Ueda et al. contain no filler and do not have voids therein. Consequently, the molded articles obtained are transparent or translucent. Furthermore, although there is description in Ueda et al. that a filler as an example of resin additives may be added to the composition, no specific examples of filler kind are disclosed therein.

Furthermore, experimentation set forth in the enclosed second Supplemental Declaration executed by joint inventor Masaaki Yamanaka (to be discussed further under subheading (H) infra), was also conducted wherein a film was attempted to be produced using a composition of Ueda et al. under the conditions of Takashi et al. (Experiment 5).

The composition of Example 43 of Ueda et al., was selected as closest to the present invention.

As a result of the experimentation, biaxially stretched film could not be obtained because the sheet broke at a portion clipped by a chuck of the tenter stretching machine when stretched in the transverse direction. This is believed to be ascribable to the following reason; because polypropylene (PP) of grade suitable for injection molding has MFR of 9 g/min., high flowing property and low melting tension, when the polypropylene was stretched in the transverse direction with a chuck of the tenter stretching machine heated at a temperature of 160°C (a temperature around the melting point of PP), the sheet broke and could not be stretched. The fusion bond of the sheet on the chuck was observed after the sheet was broken. Accordingly, it is clear that biaxially stretched film is difficult to produce from the composition of Ueda et al under the conditions of Takashi et al.

Therefore, it is not obvious to use the filler and processing taught in Takashi et al with the polymer and antistatic compound taught in Ueda et al.

(D) OHBA ET AL. ADDS NOTHING TO THE COMBINATION OF TAKASHI ET AL. AND UEDA ET AL. TO RENDER OBVIOUS THE CLAIMED INVENTION.

Ohba et al. disclose an invention relating to a synthetic paper comprising a polyolefin containing fine inorganic particles. There is description therein that the synthetic paper has an opacity of 80% or higher and excellent suitability for writing with a pencil. However, the object of Ohba et al. is to provide a polyolefin-based synthetic paper which does not curl upon infiltration of a printing ink solvent.

Specifically, the synthetic paper is one which is excellently suitable for writing with a pencil and in printability and which comprises a stretched polyolefin film layer containing

from 8 to 65% by weight fine inorganic particles, a stretched ethylene/vinyl alcohol copolymer film layer laminated to at least one side of the polyolefin film layer, and a coating layer formed on the outer side of at least one of the stretched ethylene/vinyl alcohol copolymer films.

The invention by Ohba et al. differs in layer constitution from the present invention. There is no description therein concerning improvement in suitability for paper feeding/discharge, a low surface resistivity, incorporation of a polymeric antistatic agent, or the like, which are subjects for offset printing to be accomplished by the present invention.

In conclusion, Ohba et al. cannot add to the combination of Takashi et. al. and Ueda et al. to render obvious the claimed invention.

(E) THE EVIDENCE PRESENTED IN THE COMPARATIVE TESTING FOUND IN THE PRESENT APPLICATION AND ACCOMPANYING DECLARATIONS EXECUTED BY JOINT INVENTOR MASAOKI YAMANAKA, DOCUMENTS IMPROVEMENT WITH THE CLAIMED INVENTION.

A total of four Declarations from joint inventor Masaaki Yamanaka, have been submitted in support of patentability and documenting the advantages provided by the claimed synthetic paper herein. The four Declarations, an initial and three Supplemental Declarations by Mr. Yamanaka, are respectfully enumerated as the Yamanaka I-IV Declarations in the discussion that follows. In this regard, the following arguments (F)-(I) regarding these Declarations will be summarized to show that surprising, unobvious advantages of the claimed invention have indeed been documented.

(F) THE YAMANAKA I DECLARATION DOCUMENTS IMPROVEMENT OF THE CLAIMED INVENTION COMPARED TO THE COMPOSITION TAUGHT IN TAKASHI ET AL.

In the first Declaration executed by inventor Masaaki Yamanaka on Oct. 6, 1999 (Yamanaka I Declaration), a comparison of the inventive paper to one prepared according to Takashi et al showed clear improvement in antistatic properties possessed by the inventive paper over Takashi et al. However, this comparison was dismissed in the first Office Action mailed December 27, 1999 on the grounds, among other reasons, it would be obvious to increase levels of antistatic agent taught in Takashi et al to improve antistatic properties.

In this Yamanaka I Declaration, the invention by Takashi et al. in which a low molecular weight antistatic agent is incorporated, is followed up to evaluate the surface resistivity before and after water washing and offset printability. The results show that the synthetic paper containing a low molecular weight antistatic agent in a small amount as in the invention by Takashi et al. (0.3 parts; the same amount as in Experiment Example 2 of the reference) was improved slightly in antistatic property and had poor suitability for paper feeding/dischage in offset printing. On the other hand, when the low-molecular weight antistatic was incorporated in as large an amount as in the present invention (16.7 parts by weight based on the resin components, as in Example 1 of the present invention), then the rolls during film formation became tacky and film formation was hence difficult. Through water washing, the surface resistivity of the film obtained deteriorated considerably from 10^{11} to 10^{15} ohms because the antistatic agent present in the film surfaces dissolved away. Thus, antistatic properties were lost. The results further show that this film prepared according to Takashi et al. had poor suitability for paper feeding/dischage in offset printing.

Therefore, the Yamanaka I Declaration documents improvement of the claimed invention compared to a composition taught in Takashi et al.

(G) THE YAMANAKA II DECLARATION DOCUMENTS RELIABILITY OF COMPARATIVE EXAMPLES 2 AND 3 IN THE PRESENT APPLICATION

In the final Office Action mailed May 25, 2000 in the present application, the Examiner now relied upon Ueda et al as allegedly teaching the claimed antistatic composition utilized in the inventive paper and further, in paragraph 3 thereof, alleged there were too many variables in the comparative testing of the Yamanaka I Declaration, with the proper comparison being to a synthetic paper of Takashi et al having a different antistatic agent from the claimed polyetheresteramide (the top of page 7 of this action). In light of this rejection, a First Supplemental Declaration executed by joint inventor Masaaki Yamanaka on March 22, 2001 (Yamanaka II Declaration), documenting the comparative testing in Yamanaka I was carried out under identical conditions for all paper, was submitted. However, in the Office Action mailed April 30, 2001 in the present application, the Examiner maintained, in paragraph 3, the comparisons remain invalid because more than one variable is changed.

This first Supplemental Declaration shows follow-up experiments which were conducted based on the Examiner's opinion (expressed in the interview held in August 2000) that in order for the Comparative Examples 2 and 3 of the present specification to comparatively show the effect of stretching, they should be conducted with respect to films which have undergone the same surface treatment. The experiments demonstrate that the antistatic properties of the polymeric antistatic agent incorporated are greatly improved by stretching.

These results document that the surface resistivity and suitability for paper feeding/discharge of Comparative Examples 1 and 2 remained unchanged irrespective of

whether the film had undergone a corona treatment or not; thus, the extrudate sheets obtained from the composition disclosed by Ueda et al. had insufficient antistatic properties. Namely, it has been demonstrated that stretching is essential for the effective development of antistatic properties.

(H) THE YAMANAKA III DECLARATION DOCUMENTS IMPROVEMENT OF THE CLAIMED INVENTION COMPARED TO TAKASHI ET AL.

In a second Supplemental Declaration executed July 12, 2002 by Masaaki Yamanaka in the present application (Yamanaka III Declaration), a comparison was conducted between Example 12 of Takashi et al. with both polyetheresteramide and other antistatic agent, against the inventive paper. The results in the Yamanaka III Declaration clearly document both improved antistatic properties and printability. However, the Yamanaka III Declaration has been attacked in the Office Action mailed January 27, 2003 on the grounds, among other reasons

[S]aid experiment does not agree in scope with the present claims [emphasis added] (Page 4, bottom)

However, it is respectfully pointed out this experiment recreates the composition of Takashi et al, and not the claimed paper; the test results presented in the Yamanaka III Declaration specifically prepare and ultimately compare paper according to the combination of Takashi et al with Ueda et al, as the Examiner has explicitly requested. More particularly, the Yamanaka III Declaration explicitly compares compositions prepared with

(a) the composition of Example 12 of Takashi et al with the antistatic agent and amount taught in Takashi et al (Experiment 1);

(b) an identical composition according to Takashi et al, except for substitution of a polyetheresteramide antistatic agent according to the present invention (Experiment 2); and

(c) an identical composition to (b) supra, except using the polyetheresteramide in a much larger amount of 20 parts by weight (Experiment 3), with a composition prepared according to the present invention (Experiment 4). As clearly documented, surface resistivity improved after washing with only the inventive composition (Experiment 4), with satisfactory printability only being attained with the inventive composition. Further, it was attempted to prepare a film comprising a composition taught in Ueda et al according the processing conditions of Takashi et al, in the Yamanaka III Declaration (Experiment 5). It has been documented impossible to prepare such a film in the Yamanaka III Declaration.

However, in the Office Action mailed January 27, 2003, the Examiner dismisses the Yamanaka III Declaration by first stating Takashi et al is relied on as teaching a biaxially-oriented polyolefin composition useful as paper with Ueda teaching the antistatic component (Ueda et al not being relied upon for teaching their entire composition), and then stating Ueda et al are not limited to molded compositions, i.e., their teachings. This is a total contradiction.

(I) THE YAMANAKA IV DECLARATION DOCUMENTS IMPROVEMENT OF THE CLAIMED INVENTION OVER ANY POSSIBLE COMBINATION OF TAKASHI ET AL. AND UEDA ET AL.

In a third Supplemental Declaration executed by inventor Masaaki Yamanaka on May 19, 2003 (Yamanaka IV Declaration), eight experiments were carried out preparing different-layer films under a variety of conditions utilizing the composition prepared according to Example 12 of Takashi et al (Experiments 1-4), different-layer films prepared according to Example 1 in the present application (Experiments 5-7), and a three-layer film

prepared according to Takashi et al but with a polyetheresteramide antistatic agent in large amount (Experiment 8). The results documented in the Yamanaka IV Declaration clearly indicate

(a) good resistivity and offset printability was only attained by paper prepared according to the claimed invention (Experiment 7), and

(b) a paper prepared according to Takashi et al and containing an antistatic agent of the type and amount of Ueda et al still failed to result in good resistivity and printability (Experiment 8).

In attacking the Yamanaka IV Declaration on page 5 of the July 11, 2003 Office Action, the Examiner states

[T]he second experiment is not representative of a paper rendered obvious by Takashi in view of Ueda. . . . Ueda teaches that b2 is necessarily present and components C, and D are desirably present. . . .

However, this is directly contrary to other assertions by the Examiner in this and previous Office Actions that Ueda et al are only relied upon for teaching the antistatic agent and not any other components. Then, when a composition according to Ueda et al was unsuccessfully prepared into a film in the Yamanaka III and IV Declarations, the Examiner simply dismisses this test result as “not representative of the prior art” [emphasis added] on page 6 of the July 11, 2003 Office Action.

Furthermore, on page 6 of the July 11, 2003 Office Action, the Examiner disagrees high molecular weight antistatic agent of Ueda et al. has been tested in the comparative compositions of the Yamanaka III and IV Declarations. Attention is again respectfully called to Production Example 1 on page 26 of the present application, where it is explicitly

stated an ethylene oxide adduct of bisphenol A having a number average molecular weight of 1,000 is incorporated into the polyetheresteramide of the inventive paper. Incorporation of this component b2 is described in greater detail at page 10-12 of the present application. Polyetheresteramide B1 contains component b2; polyetheresteramide B2, prepared according to Production Example 2 on page 27 of the present application, also contains component b2. Accordingly, component b2 is clearly present in the antistatic agent component of the inventive paper.

(J) DEPENDENT CLAIMS 30-49 ALSO RECITE PATENTABLE SUBJECT MATTER OVER THE APPLIED ART.

Takashi et al., Ueda et al. and Ohba et al. all fail to disclose the specific stretching amounts of the specific paper recited in Claim 30. These three references contain no disclosure of the paper having the specific void content as recited in Claim 31; the microvoid volume % range at column 7, lines 7-54 of Ohba et al. is different from the claimed range. In this regard, it is pointed out none of these references disclose explicit formation of cracks on the surface of the stretched film through which antistatic agent can penetrate to the surface of the film.

The specific oxidation treatments of the specific paper composition recited in Claim 32 are not disclosed in any of these references, with the specific corona discharge level recited in Claim 33 also not disclosed. The particular viscosity values of components B and C respectively recited in Claims 34 and 38 are neither disclosed nor suggested by these references. The specific structure of paper composition recited in Claim 47 is not taught in either Takashi et al. or Ohba et al., with Ueda et al. not even directed to a paper, as set forth supra.

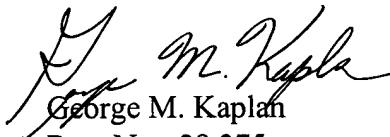
The specific thickness ranges of the paper and constituent layers as recited in Claims 46 and 48 are not taught in any of these three references, while the stretching into long particles recited in Claim 49 is not disclosed in any of this art. Finally, the specific combination of components recited in Claims 35-37 and 39-45 is neither disclosed nor suggested in these three references.

All of the features recited in the dependent claims result in the advantageous improvements in paper-handling well-documented in the present application and accompanying four Declarations from joint inventor Masaaki Yamanaka.

(8) CONCLUSION

For the forgoing reasons and all reasons of record, it is submitted appealed Claims 1 and 28-49 are patentable over the prior art relied upon by the Examiner. Accordingly, reversal of the final rejection of all claims by the Board is believed to be warranted and respectfully requested.

Respectfully submitted,


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(9) CLAIMS APPENDIX

Appealed Claims 1 and 28-49 are as follows:

1. A synthetic paper which comprises a film obtained by oxidizing the surface of a film obtained by stretching a resin film comprising as the base material a resin composition comprising
100 parts by weight of resin components and from 10 to 250 parts by weight of component E: fine inorganic particles;
said resin components comprising, based on the total weight of the resin components;
55-90 wt% of component A: a polypropylene resin,
5-40 wt% of component B: a polyetheresteramide containing aromatic rings which is derived from
component b1: a polyamide having a number-average molecular weight of from 200 to 5,000 and containing a carboxyl group at each end, and
component b2: an alkylene oxide adduct of bisphenol having a number-average molecular weight of from 300 to 5,000,
3-20 wt% of component C: a polyamide resin, and
1-20 wt% of component D: at least one modified low-molecular weight polypropylene selected from the group consisting of
component d1: an acid-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and an acid value of from 5 to 150,

component d2: a hydroxy-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and a hydroxyl value of from 5 to 150, and

component d3: an ester-modified low-molecular weight polypropylene obtained by partly or wholly esterifying component d1 with a polyoxyalkylene compound and having a number-average molecular weight of from 1,000 to 28,000;

said stretching being conducted at a temperature lower than the melting point of the polypropylene resin as component A, said stretching and oxidation of said stretched film generating ultrafine cracks on a surface of said stretched film through which component B as permanent antistatic agent appears and possessing gloss of from 15 to 60% and opaqueness of from 83 to 96%.

28. A synthetic paper which comprises a film obtained by oxidizing the surface of a film obtained by stretching a resin film comprising as the base material a resin composition comprising

100 parts by weight of resin components and from 10 to 250 parts by weight of component E: fine inorganic particles;

said resin components comprising, based on the total weight of the resin components;

55-90 wt% of component A: a polypropylene resin,

5-40 wt% of component B: a polyetheresteramide containing aromatic rings

which is derived from

component b1: a polyamide having a number-average molecular weight of from 200 to 5,000 and containing a carboxyl group at each end, and

component b2: an alkylene oxide adduct of bisphenol having a number-average molecular weight of from 300 to 5,000,

3-20 wt% of component C: a polyamide resin, and

1-20 wt% of component D: at least one modified low-molecular weight polypropylene selected from the group consisting of

component d1: an acid-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and an acid value of from 5 to 150,

component d2: a hydroxy-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and a hydroxyl value of from 5 to 150, and

component d3: an ester-modified low-molecular weight polypropylene obtained by partly or wholly esterifying component d1 with a polyoxyalkylene compound and having a number-average molecular weight of from 1,000 to 28,000;

said stretching being conducted at a temperature lower than the melting point of the polypropylene resin as component A, said stretching and oxidation of said stretched film generating ultrafine cracks on a surface of said stretched film through which component B as permanent antistatic agent appears.

29. A synthetic paper which comprises a film obtained by oxidizing the surface of a film obtained by stretching a resin film comprising as the base material a resin composition comprising

100 parts by weight of resin components and from 10 to 250 parts by weight of component E: fine inorganic particles;

said resin components comprising, based on the total weight of the resin components;

55-90 wt% of component A: a polypropylene resin,

5-40 wt% of component B: a polyetheresteramide containing aromatic rings which is derived from

component b1: a polyamide having a number-average molecular weight of from 200 to 5,000 and containing a carboxyl group at each end, and

component b2: an alkylene oxide adduct of bisphenol having a number-average molecular weight of from 300 to 5,000,

3-20 wt% of component C: a polyamide resin, and

1-20 wt% of component D: at least one modified low-molecular weight polypropylene selected from the group consisting of

component d1: an acid-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and an acid value of from 5 to 150,

component d2: a hydroxy-modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and a hydroxyl value of from 5 to 150, and

component d3: an ester-modified low-molecular weight polypropylene obtained by partly or wholly esterifying component d1 with a polyoxyalkylene compound and having a number-average molecular weight of from 1,000 to 28,000;

said stretching being conducted at a temperature lower than the melting point of the polypropylene resin as component A.

30. The synthetic paper as claimed in claim 28 wherein the stretched resin film is one obtained by compounding a resin composition comprising the polypropylene resin as component A, the polyetheresteramide having aromatic rings as component B, the polyamide resin as component C, and the modified low-molecular weight polypropylene as component D with the fine inorganic particles as component E, melt-extruding the resulting resin composition into a film, and then stretching the extrudate with an ordinary uni- or biaxially stretching machine either uniaxially from 3 to 8 times or biaxially from 10 to 60 times in terms of areal ratio at a temperature lower than the melting point of the polypropylene resin.

31. The synthetic paper as claimed in Claim 28, wherein the stretched resin film has a void content of from 10 to 60% as calculated using the following equation (1):

$$\text{Void content (\%)} = (\rho^{\circ} - \rho) \times 100 / \rho^{\circ} \quad (1)$$

wherein ρ° is a density of the unstretched film, and ρ is a density of the stretched film.

32. The synthetic paper as claimed in Claim 28, wherein the oxidation of the surface of the stretched resin film is conducted by a treatment selected from corona discharge treatment, flame-plasma treatment, flame treatment, glow discharge treatment, and ozone treatment.

33. The synthetic paper as claimed in Claim 32, wherein the corona discharge treatment is performed in an amount of from 20 to 500 W/min • m².

34. The synthetic paper as claimed in Claim 28, wherein the polyetheresteramide having aromatic rings as component B has a reduced viscosity (0.5 wt% m-cresol solution, 25°C) of from 0.5 to 4.0.

35. The synthetic paper as claimed in Claim 28, wherein the polyetheresteramide having aromatic rings as component B is a polymer derived from the following components b1 and b2:

component b1: a polyamide having a number-average molecular weight of from 500 to 3,000 and containing a carboxyl group at each end,

component b2: an alkylene oxide adduct of bisphenol having a number-average molecular weight of from 1,000 to 3,000.

36. The synthetic paper as claimed in Claim 28, wherein the polyetheresteramide having aromatic rings as component B is a polymer synthesized from ϵ -caprolactam, an ethylene oxide adduct of bisphenol A, and adipic acid.

37. The synthetic paper as claimed in Claim 28, wherein the polyetheresteramide having aromatic rings as component B is a polymer synthesized from 12-aminododecanoic acid, adipic acid, and an ethylene oxide adduct of bisphenol A.

38. The synthetic paper as claimed in Claim 28, wherein the polyamide resin as component C has a reduced viscosity (97% sulfuric acid, concentration 1 g/100 ml, 30°C) of from 0.8 to 5.

39. The synthetic paper as claimed in Claim 28, wherein the polyamide resin as component C is a polyamide selected from the group consisting of nylon 66, nylon 69, nylon 610, nylon 612, nylon 6, nylon 11, nylon 12, nylon 46, nylon 6/66, nylon 6/10, nylon 6/12, and nylon 6/66/12.

40. The synthetic paper as claimed in Claim 28, wherein the modified low-molecular weight polypropylene as component D is at least one member selected from the following components d1 to d3:

component d1: a modified low-molecular weight polypropylene having a number-average molecular weight of from 1,000 to 20,000 and an acid value of from 10 to 100,

component d2: a modified low-molecular weight polypropylene having a number-average molecular weight of from 800 to 25,000 and a hydroxyl value of from 10 to 100,

component d3: a modified low-molecular weight polypropylene obtained by partly or wholly esterifying component d1 with a polyoxyalkylene compound and having a number-average molecular weight of from 1,200 to 25,000.

41. The synthetic paper as claimed in Claim 28, wherein the modified low-molecular weight polypropylene as component D is a polymer obtained by reacting a low-molecular weight polypropylene having a number-average molecular weight of from 700 to 20,000 with an unsaturated acid selected from acrylic acid, methacrylic acid, maleic acid, maleic anhydride, fumaric acid, itaconic acid, itaconic anhydride, and citraconic anhydride.

42. The synthetic paper as claimed in Claim 41 wherein the modified low-molecular weight polypropylene as component D is a polymer obtained by additionally reacting the modified low-molecular weight polypropylene with an aliphatic amine selected from monomethanolamine, monoisopropanolamine, diethanolamine, and diisopropanolamine.

43. The synthetic paper as claimed in Claim 41, wherein the modified low-molecular weight polypropylene as component D is a polymer obtained by additionally esterifying part or all of the carboxylic acid moieties of the modified low-molecular weight polypropylene with a hydroxylated polyoxyalkylene compound.

44. The synthetic paper as claimed in Claim 28, wherein the fine inorganic particles as component E are particles of at least one member selected from calcium carbonate, calcined clay, silica, diatomaceous earth, talc, titanium oxide, lithium chloride, potassium

chloride, magnesium chloride, calcium chloride, sodium bromide, potassium bromide, and magnesium bromide.

45. The synthetic paper as claimed in Claim 28, wherein the resin composition comprises 100 parts by weight of resin components consisting of

| | |
|------------------------------------|-----------|
| component A: a polypropylene resin | 60-85 wt% |
|------------------------------------|-----------|

| | |
|--------------------------------------|--|
| component B: the polyetheresteramide | |
|--------------------------------------|--|

| | |
|-----------------------|----------|
| having aromatic rings | 5-30 wt% |
|-----------------------|----------|

| | |
|--------------------------------|----------|
| component C: a polyamide resin | 3-15 wt% |
|--------------------------------|----------|

and

| | |
|---|--|
| component D: the modified low-molecular | |
|---|--|

| | |
|----------------------|----------|
| weight polypropylene | 3-15 wt% |
|----------------------|----------|

the total amount of all resin components being 100 wt% and from 10 to 250 parts by weight of

| | |
|--|--|
| component E: fine inorganic particles. | |
|--|--|

46. The synthetic paper as claimed in Claim 28, which has a thickness of from 8 to 300 μm .

47. A synthetic paper which comprises a biaxially stretched thermoplastic resin film base material and, laminated thereto on each side, a surface layer consisting of a uniaxially stretched film of the resin composition as claimed in Claim 28.

48. The synthetic paper as claimed in Claim 46, wherein the surface layer consisting of the stretched film of the resin composition has a thickness of from 5 to 50 μm , and the total thickness of all constituent layers is from 8 to 300 μm .

49. The synthetic paper as claimed in Claim 28, wherein components B, C, and D are elongated by the stretching into long particles.

(10) EVIDENCE APPENDIX

Copies of the following four Declarations I-IV from joint inventor Masaaki Yamanaka are appended hereto:

Initial Declaration executed October 6, 1999 (Yamanaka I Declaration);

First Supplemental Declaration executed March 22, 2001 (Yamanaka II Declaration);

Second Supplemental Declaration executed July 12, 2002 (Yamanaka III Declaration); and

Third Supplemental Declaration executed May 19, 2003 (Yamanaka IV Declaration)



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Yamanaka et al.

Examiner: Kruer, K.

Serial No.: 08/855,905

Group Art Unit: 1773

Filed: May 14, 1997

Docket: 443-17

For: SYNTHETIC PAPER MADE OF
STRETCHED POLYPROPYLENE FILM

Assistant Commissioner for Patents
Washington, D.C. 20231

DECLARATION

Sir:

I, Masaaki Yamanaka, do hereby declare:

1. I am one of the joint inventors of the present U.S. application;
2. I have been engaged in research and development of synthetic paper at Oji-Yuka Synthetic Paper Co., Ltd. since 1969;
3. I am an inventor of the following U.S. Patents: U.S. Patent Nos. 4,097,645; 4,340,639; 4,341,880; 4,418,112; 4,420,530; 4,472,227; 4,483,965; 4,663,216; 4,705,719; 4,795,676; 4,986,866; 5,254,302; 5,332,542; 5,409,754 and 5,670,225 and the corresponding foreign patents such as Japanese and European patents;
4. The experimentation outlined in the present U.S. application, the results thereof being documented in Tables 1 and 2 therein, was carried out with my involvement, direction and supervision;

5. The following additional Experiments 1 and 2, the results presented in accompanying Tables 1-3, was also carried out with my involvement, direction and supervision:

Experiment 1

A duplicate experiment was made on Example 2 of U.S. Patent No. 4,318,950 (invention made by the parent company of Oji-Yuka Synthetic Paper Co., Ltd., which is one of the present assignees (This technique has been transferred to Oji-Yuka Synthetic Paper Co., Ltd.)).

A resin composition (A) comprising 90 parts by weight of NOVATEC PP MA-8 (polypropylene produced by Japan Polychem Corporation; melting point: 164°C), 10 parts by weight of NOVATEC HD HJ580 (high density polyethylene produced by Japan Polychem Corporation; melting point: 134°C), 5 parts by weight of clay having a particle diameter of 1 μ m produced by ENGELHARD MINERALS & CHEMICALS CO., 1.0 parts by weight of calcium stearate as a stabilizer, 0.1 parts by weight of TOPANOL (1,3,5-tris(2-methyl-4-hydroxy-5-t-butyl phenol)butane)), 0.3 parts by weight of NYMEEN S-210 (dispersant produced by NOF Corp.) and 0.3 parts by weight of PHOSPHANOL RL-210 (revised name of "PHOSPHANOL SM-1", produced by TOHO Chemical Inc.) as a low-molecular weight antistatic agent was melt-kneaded through an extruder, and then extruded through a die into a sheet at a temperature of 250°C. The sheet thus formed was cooled to a temperature of about 50°C.

Subsequently, the sheet was heated to a temperature of about 140°C where

it was then longitudinally oriented by a factor of 2 utilizing the difference in circumferential speed between rolls to obtain a longitudinally-oriented film. Separately, a resin composition (B) comprising 80 parts by weight of NOVATEC PP MA-8 (polypropylene produced by Japan Polychem Corporation; melting point: 165°C), 20 parts by weight of NOVATEC HD HJ580 (high density polyethylene produced by Japan Polychem Corporation; melting point: 134°C), 5 parts by weight of clay having a particle diameter of 1 μm produced by ENGELHARD MINERALS & CHEMICALS CO., 1.0 parts by weight of calcium stearate as a stabilizer, 0.1 parts by weight of TOPANOL (1,3,5-tris(2-methyl-4-hydroxy-5-*t*-butyl phenol)butane)), 0.3 parts by weight of NYMEEN S-210 (dispersant produced by NOF Corp.) and 1.0 parts by weight of PHOSPHANOL RL-210 (revised name of "PHOSPHANOL SM-1", produced by TOHO Chemical Inc.) as a low-molecular weight antistatic agent was separately melt-kneaded through two extruders, and then extruded through a die onto the respective surface of the foregoing longitudinally-oriented film to obtain a paper-like layer (B)/base layer (A)/paper-like layer (B).

The three-layer film (B/A/B) was introduced into a tenter oven where it was then heated to a temperature of 160°C. The film was then oriented crosswise by a factor of 5 at a temperature of 150°C using the tenter. Subsequently, the film was thermally set at a temperature of 140°C. The film was subjected to corona discharge treatment at 70 W/m²/min on the paper-like layer (B layer) side thereof, cooled to a temperature of 55°C, and then slit at the edge thereof to obtain a three-layer synthetic paper having a thickness of 170 μm (B/A/B = 60/50/60 μm). The synthetic paper thus

obtained was a composite film comprising a biaxially-oriented base layer and two uniaxially-oriented paper-like layers (surface layers).

Experiment 2

A uniaxially-oriented paper was prepared in the same manner as in Example 1, except that instead of PHOSPHANOL SM-1, PHOSPHANOL RL-210 (produced by TOHO Chemical Inc.) was used as an antistatic agent and the incorporation of the resin component in the surface layer was effected as set forth in Table 2. During the preparation of the synthetic paper, the resin became sticky to the molding roll at the molding step. Thus, the resin could be hardly molded.

Table 3 shows the results of the evaluation of surface resistivity and offset printability of the synthetic papers obtained by Experiments 1 and 2 according to the method described in the present application. Referring to surface resistivity, Experiment 1 (low-molecular weight antistatic agent content: 0.3 parts) shows some improvement ($6 \times 10^{13} \Omega$) before rinsing but shows deterioration ($6 \times 10^{15} \Omega$) after rinsing. Experiment 2 (low-molecular weight antistatic agent content: 16.7 parts) shows a surface resistivity as high as $4 \times 10^{11} \Omega$ before rinsing but shows a drastic deterioration ($5 \times 10^{15} \Omega$) after rinsing. This is presumably because the low-molecular weight antistatic agent elutes out of the surface of the film during rinsing. Referring to adhesion of ink, both Experiments 1 and 2 evaluated only fair and thus are practically unacceptable. Referring to feedability and dischargeability, both Experiments 1 and 2 evaluated poorly and are liable to frequent trouble in feed and discharge. Thus, Experiments 1 and 2 are practically unacceptable;

6. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1999. 10. 6
Date

Masaaki Yamanaka
Masaaki Yamanaka

NYMEEN S-210: produced by NOF Corp.

Table 2

| Table 2 | | | | | | | | | |
|------------------------------------|--|------------------------------|------------------|---------------------|------------------------------------|--------------------------------------|----------------------|----|--------|
| Final composition of surface layer | | | | | | Molding/stretching/surface treatment | | | |
| Resins (100 parts) | | Fine inorganic particles (E) | | Thickness (μm) | | Stretching of surface layer | | of | |
| PP | Modif- | CaCO ₃ | TiO ₂ | front/core/ back | Uni- biaxial stret- ching | or Stret- ching ratio | Surface treatment | | |
| | ied pp | | | | | | | | |
| | (D1) | | | | | | | | |
| Ex.1 | Blended amount is set forth in Table 1 | | | | | 60/50/60 | uniaxial | 5 | corona |
| Ex.2 | 72.3 | 16.7 | 5.5 | 72.7 | 9.1 | 20/60/20 | uniaxial | 8 | corona |

Table 3

| | Evaluation | | | |
|-------|----------------------|----------------------|---------------------|--------------------------------------|
| | Surface resistivity | | Offset printability | |
| | (a) | (b) | Ink adhesion | Suitability for paper feed/discharge |
| Ex. 1 | 6 x 10 ¹³ | 6 x 10 ¹⁵ | Fair | Poor |
| Ex. 2 | 4 x 10 ¹¹ | 5 x 10 ¹⁵ | Fair | Poor |

Table 1

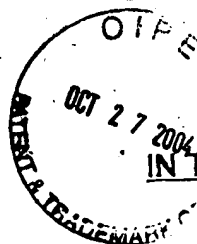
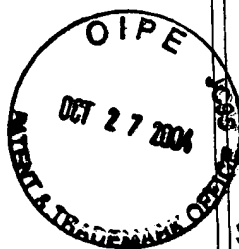
| Components: Paper-like layer | | | | | | | | | | |
|------------------------------|-------|-------|--------|-------|-------------|-------|-------------------|-------|------------------|-------|
| | Resin | Parts | Filler | Parts | Stabilizer | Parts | Anti-static agent | Parts | Dispersing agent | Parts |
| Ex.1 | PP*1 | 80 | clay | 5 | Ca-stearate | 1.0 | PHOS-PHANOL SM-1 | 0.3 | NYMEEN S-210 | 1.0 |
| | PE | 20 | | | TOPANOL | 0.1 | | | | |
| Components: Base layer | | | | | | | | | | |
| | Resin | Parts | Filler | Parts | Stabilizer | Parts | Anti-static agent | Parts | Dispersing agent | Parts |
| Ex.1 | PP*2 | 90 | clay | 5 | Ca-stearate | 1.0 | PHOS-PHANOL SM-1 | 0.3 | NYMEEN S-210 | 0.3 |
| | PE | 10 | | | TOPANOL | 0.1 | | | | |

PP*1: NOVATEC.PP, MA-3, polypropylene produced by Japan Polychem Corporation (melting point: 165°C)

PP*2: NOVATEC.PP, MA-8, polypropylene produced by Japan Polychem Corporation (melting point: 164°C)

PE: NOVATEC HD, HJ580, high density polyethylene produced by Japan Polychem Corporation (melting point: 134°C)

clay: clay having a particle diameter of 1 μ m produced by ENGELHARD MINERALS & CHEMICALS CO. PHOSPHANOL SM-1: PHOSPHANOL RL-210 (revised name of PHOSPHANOL SM-1), produced by TOHO Chemical, was used.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Yamanaka et al.

Examiner: Kruer, K.

Serial No.: 08/855,905

Group: Art Unit 1773

Filed: May 14, 1997

Docket: 443-17

For: SYNTHETIC PAPER
MADE OF STRETCHED
POLYPROPYLENE FILM

Assistant Commissioner for Patents
Washington, D.C. 20231

SUPPLEMENTAL DECLARATION

I, **Masaaki Yamanaka**, do hereby declare:

1. I am the Declarant who executed the previous declaration on
October 6, 1999 in the above-identified application;
2. The following additional experimentation was carried out under my
supervision and control:

EXPERIMENTATION 1

Experimentation 1 was conducted in the same manner as in Comparative
Example 2 in the present application except that corona discharge treatment was
carried out as surface treatment.

EXPERIMENTATION 2

Experimentation 2 was conducted in the same manner as in Comparative Example 3 in the present application except that surface treatment (corona discharge treatment) was not carried out.

Table 1

| | Final Composition of Surface Layer | | | | Molding, Stretching/Surface Treatment | | | |
|-------|------------------------------------|------|-----|-------------|---------------------------------------|-----------------------------|------------------|-------------------|
| | Resins (100 parts) | | | | Thickness (μm) | Stretching of Surface Layer | | Surface treatment |
| | PP | PEEA | PA | Modified PP | Front/core/back | Uni- or biaxial Stretching | Stretching Ratio | |
| | | (B1) | | (D1) | | | | |
| Ex. 1 | 82 | 10.8 | 3.6 | 3.6 | 20/60/20 | Uniaxial | 8 | Corona |
| Ex. 2 | 82 | 10.8 | 3.6 | 3.6 | 20/60/20 | No Stretching | | None |

Table 2

| Evaluation | | | | | | |
|------------|----------------------------------|--------------------|---------------------|---|------------------|-------------|
| | Surface Resistivity (Ω) | | Offset Printability | | Optical Property | |
| | (a) | (b) | Ink Adhesion | Suitability for Paper Feeding/Discharge | Gloss (%) | Opacity (%) |
| Ex. 1 | 8×10^{11} | 7×10^{11} | Δ | \circ | 90 | 80 |
| Ex. 2 | 5×10^{14} | 5×10^{14} | X | X | 98 | 60 |

The symbols in Table 2 denote the following:

Δ: The ink was peeled almost completely to pose a problem in practical use although the peeling force required was not so weak;

O: the number of stops was 1;

X: All the ink was peeled with very weak peeling force and was incapable of practical use and the number of stops was 6 or greater;

3. A copy of Table 3 from the preceding Declaration is enclosed on which the evaluations have been changed from fair to Δ and poor to X to provide consistency with the evaluations presented in the above-identified application and the present supplemental Declaration;

4. Referring to the test results presented herein, in Experimentation 1, the ink adhesion was improved from "X" to "Δ" because the corona discharge treatment was carried out, but in Experimentation 2, the ink adhesion deteriorated from "Δ" to "X" because the corona discharge treatment was omitted; and

5. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

March 22, 2001

Date

Masaaki Yamanaka
Masaaki Yamanaka

NYMEEN S-210: produced by NOF Corp.

Table 2

| Final composition of surface layer | | Molding/stretching/surface treatment | | | |
|------------------------------------|--|--------------------------------------|------------------|------------------------------------|--------------------------|
| Resins (100 parts) | | Fine inorganic particles (E) | Thickness (μm) | Stretching surface layer | of |
| PP | Modif- ied PP | CaCO ₃ | TiO ₂ | Uni- biaxial stret- ching | Stret- ching ratio |
| | (D1) | | | | |
| Ex.1 | Blended amount is set forth in Table 1 | | 60/50/60 | uniaxial | 5 |
| Ex.2 | 72.3 | 16.7 | 5.5 | 72.7 | 9.1 |
| | | | | 20/60/20 | 8 |
| | | | | | Surface treatment |
| | | | | | corona |
| | | | | | corona |

Table 3

| | Evaluation | | | |
|-------|---------------------|--------------------|---------------------|--------------------------------------|
| | Surface resistivity | | Offset printability | |
| | (a) | (b) | Ink adhesion | Suitability for paper feed/discharge |
| Ex. 1 | 6×10^{11} | 6×10^{15} | Δ | X |
| Ex. 2 | 4×10^{11} | 5×10^{15} | Δ | X |



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Yamanaka et al.

Examiner: Kruer, K.

Serial No.: 08/855,905

Group: Art Unit 1773

Filed: May 14, 1997

Docket: 443-17

For: SYNTHETIC PAPER
MADE OF STRETCHED
POLYPROPYLENE FILM

Assistant Commissioner for Patents
Washington, D.C. 20231

Second Supplemental Declaration under 37 C.F.R. § 1.132

I, Masaaki Yamanaka, do hereby declare:

1. I am the Declarant who executed the previous declarations on October 6, 1999 and March 22, 2001 in the above-identified application;
2. The following experimentation (3 experiments) was carried out under my supervision and control:

A. EXPERIMENT 1

The same procedure as in Example 12 of the invention of Takashi et al. (U.S. Pat. No. 4,318,950) was performed. The same composition as in Tables I(b) and II(b) and the same molding conditions as in Table III of Takashi et al. were used but conditions not described in Takashi et al., such as extrusion temperature, cooling temperature, etc. were replaced by those described in the present application.

A resin composition (A) containing 80 parts by weight of polypropylene (Novatec PP, MA-8 manufactured by Japan Polychem Corp, melting point 164°C), 20 parts by weight of polyamide (extrusion grade Nylon 6, UBE Nylon 1022FDX23

manufactured by Ube Industries, Ltd.), 0.5 part by weight of diatomaceous earth and 0.1 part by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) was melt-kneaded with an extruder set at 270°C, subsequently extruded into a sheet, and then cooled to a temperature of about 50°C.

After being heated to about 140°C, this sheet was stretched in the machine direction 5 times using a peripheral velocity of rolls to obtain a machine-directionally stretched film.

A resin composition (B) containing 80 parts by weight of polypropylene (Novatec PP, MA-3 manufactured by Japan Polychem Corp, melting point 165°C), 20 parts by weight of polyamide (UBE Nylon 1022FDX 23 manufactured by Ube Industries, Ltd.), 80 parts by weight of clay (particle size 1 micron, manufactured by Englehart Minerals & Chemicals Co.), 0.5 parts by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) and 0.7 parts by weight of low molecular weight antistatic agent (PHOSPHANOL RL-20, (formerly Phosphanol SM-1), manufactured by Toho Chemical Industry Co. Ltd. and used in Example 1 of Takashi et al. (the low molecular weight antistatic agent of RESISTAT PE132 of Example 12 of Takashi et al. no longer being available) was melt-kneaded with two extruders set at 250°C separately, extruded from the die into a film (A) on both surfaces of the machine-directionally stretched film and then laminated (B/A/B) to form a laminate (paper-like layer/base layer/paper-like layer).

This three layer film (B/A/B) was introduced into a tenter oven, heated to 165°C, stretched in the transverse direction 7 times with a tenter stretching machine at a temperature of 160°C and then heat-set at a temperature of 140°C. Subsequently, the stretched film was treated with 70 W/m²·min. corona discharge on the side of the paper-like layer(layer B), cooled to a temperature of 55°C and trimmed. The thickness of the three-layer stretched film was 140 microns and the thickness of the individual layers (B/A/B) were 50 µm/40µm/50µm. The thus obtained synthetic film is a composite film containing a biaxially stretched base layer (A) and two uniaxially stretched paper-like layers (B) (surface layers).

B. EXPERIMENT 2

The same procedure as in Experiment 1 was performed except for changing the low molecular weight antistatic agent to a high-molecular weight antistatic agent of the present application, polyetheresteramide (product Example 1(B1) in the present application).

C. EXPERIMENT 3

The same procedure as in Experiment 2 was performed except for using the high-molecular weight antistatic agent in an amount of 20 parts by weight (16.7% by weight based on the resin components).

D. EXPERIMENT 4

The same procedure as in Example 1 on pages 29-31 of the present application.

The composition of these three Experiments 1-4 supra are set forth in accompanying Table I.

C. Evaluation of Experiments 1-4

(1) Surface resistivities of the synthetic papers before and after washing with water and (2) ink adhesion and suitability for paper feeding/discharge as the offset printability, were evaluated according to the procedures set forth in the present application. The results are shown in Table 2 below.

(1) Surface Resistivity

The surface resistivity of the synthetic paper containing 0.7 part by weight of low-molecular weight antistatic agent of Experiment 1 was found to be $2 \times 10^{13} \Omega$ before washing with water, which was somewhat improved, but $1 \times 10^{16} \Omega$ after washing with water, which deteriorated.

The surface resistivity of the synthetic paper containing 0.7 part by weight of polyetheresteramide of Experiment 2 was $2 \times 10^{14} \Omega$ before washing with water, which was somewhat improved, and $2 \times 10^{14} \Omega$ after washing with water, unchanged.

The surface resistivity of the synthetic paper containing 20 parts by weight (16.7% by weight based on the resin composition) of polyetheresteramide of

Experiment 3 was $1 \times 10^{13} \Omega$ before washing with water, which was somewhat improved and 1×10^{13} after washing with water, unchanged. Because a large amount of polyetheresteramide was added, the polyetheresteramide was insufficiently dispersed, so the surface resistivities of 10^{10} to $10^{11} \Omega$ as described in the examples of the present application could not be obtained.

The surface resistivity of Experiment 4 was 4×10^9 before washing and 3×10^9 after washing, a clear improvement after washing.

(2) Offset Printability

The symbols in Table 2 denote the following:

⊙: The ink remained unpeeled (ink adhesion) and there were no stops (feed/discharge suitability);

Δ: The ink was peeled almost completely to pose a problem in practical use although the peeling force required was not so weak (ink adhesion), and the number of printing stops was 2-5 (feed/discharge suitability); and

X: The number of printing stops was 6 or greater (feed/discharge suitability);

Referring to the results reported in Table 2, the ink adhesion on the synthetic paper of Experiment 1 was Δ and suitability for paper feeding/discharge X because of high surface resistivity;

the ink adhesion on the synthetic paper of Experiment 2 was Δ , and the suitability for paper feeding/discharge X because of high surface resistivity; and the ink adhesion on the synthetic paper of Experiment 3 was Δ , and the suitability for paper feeding/discharge Δ because of surface resistivity which was still too high; and both the ink adhesion on the synthetic paper and suitability for paper feeding/discharge of experiment 4 was \odot .

4. EXPERIMENT 5

1) A composition of Ueda et al. was selected as follows:

(A) Matrix resin: polypropylene (PP) described in the examples of Ueda et al. was used because PP is used as a matrix resin in Takashi et al. and the present invention;

(B) Polyetheresteramide (PEEA): an analogous PEEA to the PEEA used in the present invention was used in view of the examples of Ueda et al.;

(C) Polyamide resin: an analogous resin to polyamide resin used in the present invention was used in view of the examples of Ueda et al.; and

(D) Modified polypropylene (PP) resin: the analogous resin to modified PP resin used in the present invention was used in view of Ueda et al.

According to components (A) to (B) as described above, Example 43 as described on page 32 of Ueda et al. was selected as a composition of the invention of Ueda et al. More particularly, (A) the PP described on page 15, line 48 of Ueda et al, injection grade UBE Polypro J609 MFR 9g/min at 230°C and a load of 2.16 kg according to ASTM D-1238, was used; (B) the PEEA described on page 13, lines 25 to 34 of Ueda et al., which is an analogous PEEA to that of production Example 1 of the present application, was used; (C) the polyamide resin as described on page 15, line 46 of Ueda et al., Nylon 6 (UBE Nylon 1013B) was used; and (D) a modified PP described on page 22, lines 19 to 27 of Ueda et al, analogous to that of production Example 3 of the present application, was used. The compounding ratio was the same as in Example 43 which is described on page 32 of Ueda et al.

2) Compounding of the base layer

The compounding of the base layer was conducted according to Example 12 as described in Table I(b) at columns 9 to 10 in Takashi et al. A master batch was prepared from a composition obtained by adding the inorganic filler of example 12 of Takashi et al. in the amount of 0.5 part by weight diatomaceous earth, to the composition of example 43 of the invention of Ueda et al. in the same manner as described in Example 1, step (2) on pages 29-30 of the present application.

3) Compounding of the paper-like layer

The compounding of the paper-like layer was conducted as described in Example 12 at Table II(b), columns 11 to 12 of Takashi et al. A master batch was prepared from a composition obtained by adding the inorganic filler of Example 12 (80 parts by weight of clay) of Takashi et al. to the composition of Example 43 of the invention of Ueda et al. in the same manner as described in Example 1, step (2) of the present application on pages 29-30.

4) Production of the base layer film

Because Takashi et al. do not describe the extrusion condition in detail, the same extrusion conditions as described in Example 1, step (1) at page 29 of the present application was used. The master batch for the base layer obtained in step (2) above was melt kneaded in an extruder set at 270°C, extruded into a sheet and cooled in a cooler to obtain an unstretched sheet. The extruded sheet was stretched 5 times using rolls under the production conditions of Example 12 of Takashi et al. as described in Table III, column 13 of Takashi et al., at 145°C.

5) Production of the paper-like layer film

The master batch for the paper-like layer obtained in step (3) above was melt kneaded at 250°C and laminated, using two extruders, to both sides of the

stretched sheet having a stretching ratio of 5 obtained in step (4) above at 250°C as described in Table III, column 13 of Takashi et al. The sheet having the three-layer structure was heated to 165°C as described in Table III, column 13 of Takashi et al., and attempted to be stretched in the transverse direction 8 times with a tenter stretching machine at a temperature of 160°C as described in Table III, column 13 of Takashi et al.

However, when the sheet was stretched in the transverse direction, the sheet was broken at a portion clipped by a chuck of the tenter stretching machine, so a biaxially stretched sheet could not be obtained. It is believed that this occurred because the polypropylene (PP) of grade suitable for injection molding as described in the examples of Ueda et al. has MFR of 9 g/min, high flowing property and low melting tension. When the PP was stretched in the transverse direction with a chuck of the tenter stretching machine heated at a temperature of 160°C, which is a temperature close to the melting point of PP, the sheet was broken and thus could not be stretched. A fusion bond of the sheet was then observed on the chuck after the sheet was broken.

Further, the stretching of the base layer in the machine direction with rolls, before the stretching with the tenter stretching machine could be performed, because the stretching temperature was as low as 150°C and the stretching ratio was as low as 5. In stretching in the machine direction there is no restriction of fixing in the transverse direction, i.e., the sheet is free to move in the transverse direction, so the sheet is

constricted in the transverse direction while stretched in the machine direction; this is different from stretching with the tenter stretching machine.

As documented above, it is clear that the biaxially stretched film is difficult to produce with the composition of Ueda et al. under the conditions of Takashi et al.

Table 1

| Components: Base Layer | | | | | | | | | |
|------------------------------|--------------------------------------|-------|---------|-------|-------------------|-------|------------------|-------|-------|
| | Resin | Parts | Filler | Parts | Anti-Static Agent | Parts | Dispersing Agent | Parts | Parts |
| Ex. 1 | PP ¹ | 80 | Kiesel- | 0.5 | | | NYMEEN S-210 | | 1.0 |
| | Polymide ³ | 20 | Guhr | | | | | | |
| Ex. 2 | PP ¹ | 80 | Kiesel- | 0.5 | | | NYMEEN S-210 | | 1.0 |
| | Polymide ³ | 20 | Guhr | | | | | | |
| Ex. 3 | PP ¹ | 80 | Kiesel- | 0.5 | | | NYMEEN S-210 | | 1.0 |
| | Polymide ³ | 20 | Guhr | | | | | | |
| Ex. 4 | Example 1 of the Present Application | | | | | | | | |
| Components: Paper-like Layer | | | | | | | | | |
| | Resin | Parts | Filler | Parts | Anti-Static Agent | Parts | Dispersing Agent | Parts | Parts |
| Ex. 1 | PP ² | 80 | Clay | 80 | PHOSPANOL SM-1 | 0.7 | NYMEEN S-210 | | 0.5 |
| | Polymide ³ | 20 | | | | | | | |
| Ex. 2 | PP ² | 80 | Clay | 80 | PEEA | 0.7 | NYMEEN S-210 | | 0.5 |
| | Polymide ³ | 20 | | | | | | | |
| Ex. 3 | PP ² | 80 | Clay | 80 | PEEA | 20 | NYMEEN S-210 | | 0.5 |
| | Polymide ³ | 20 | | | | | | | |
| Ex. 4 | Example 1 of the Present Application | | | | | | | | |

PP¹: Polypropylene, "Novatec PP, MA-8" (trade name, melting point of 164°C) manufactured by Japan Polychem Corp.

PP²: Polypropylene, "Novatec PP, MA-3" (trade name, melting point of 165°C) manufactured by Japan Polychem Corp.

Polyamide³: Nylon 6, "UBE Nylon 1022FDX23" (trade name), manufactured by Ube Industries, Ltd.

PHOSPHANOL SM-1: "Phosphanol RL-210" (trade name has been changed), manufactured by Toho Chemical Industry,

Co., Ltd.

NYMEEN S-210: Manufactured by NOF Corp.

PEEA: polyetheresteramide of Production Example 1 of the present application.

Table 2

| | Molding/stretching/surface Treatment | | | | Evaluation | | | |
|-------|--------------------------------------|-----------------------------|------------------|-------------------|-------------------------|--------------------|---------------------|--|
| | Thickness (μm) Front/core/back | Stretching of Surface Layer | | Surface treatment | Surface Resistivity (Ω) | | Offset Printability | |
| | | Uni- or biaxial stretching | Stretching ratio | | (a) | (b) | Ink adhesion | Suitability for paper feeding/dischage |
| Ex. 1 | 50/40/50 | uniaxial | 7 | Corona | 2x10 ¹³ | 1x10 ¹⁸ | Δ | X |
| Ex. 2 | 50/40/50 | uniaxial | 7 | Corona | 2x10 ¹⁴ | 2x10 ¹⁴ | Δ | X |
| Ex. 3 | 50/40/50 | uniaxial | 7 | Corona | 1x10 ¹³ | 1x10 ¹³ | Δ | Δ |
| Ex. 4 | 20/60/20 | uniaxial | 8 | Corona | 4x10 ¹¹ | 3x10 ¹¹ | ⊙ | ⊙ |

5. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 12, 2007
Date

Masaaki Yamanaka
Masaaki Yamanaka



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Yamanaka et al.

Examiner: Kruer, K.

Serial No.: 08/855,905

Group: Art Unit 1773

Filed: May 14, 1997

Docket: 443-17

For: SYNTHETIC PAPER
MADE OF STRETCHED
POLYPROPYLENE FILM

Assistant Commissioner for Patents
Washington, D.C. 20231

THIRD SUPPLEMENTAL DECLARATION UNDER 37 C.F.R. §1.132

I. Masaaki Yamanaka, do hereby declare:

1. I am the Declarant who executed the previous Declarations on October 6, 1999, March 22, 2001 and July 12, 2002 in the above-identified application;
2. The following additional experimentation (8 Experiments) was carried out under my supervision and control:

A. Experiment 1

The same procedure as in Experiment 1 of the Second Supplemental declaration under 37 C.F.R. § 1.132 was performed. Example 12 of the invention of Takashi et al. (U.S. Pat. No. 4,318,950) was reproduced. The same compositions as in Table I(b) and Table II(b) and the same molding conditions as in Table III of Takashi et al. were used but the conditions which are not described in Takashi et al. such as extrusion temperature, cooling temperature, etc., were replaced by those as described in the present invention.

A resin composition (A) containing 80 parts by weight of polypropylene ("Novatec PP, MA-8" (trade name) manufactured by Japan Polychem Corp., a melting point of 164°C), 20 parts by weight of polyamide (extrusion grade Nylon 6, "UBE Nylon 1022FDX23" (trade name), manufactured by Ube Industries, Ltd.), 0.5 part by weight of diatomaceous earth and 0.1 part by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) was melt-kneaded with an extruder set at 270°C, subsequently extruded into a sheet, and then cooled to a temperature of about 50°C.

After being heated to about 140°C, this sheet was stretched in the machine direction 5 times using a peripheral velocity of rolls to obtain a machine-directionally stretched film.

A resin composition (B) containing 80 parts by weight of polypropylene ("Novatec PP, MA-3" (trade name) manufactured by Japan Polychem Corp., a melting point of 165°C), 20 parts by weight of polyamide ("UBE Nylon 1022FDX23" (trade name), manufactured by Ube Industries, Ltd.), 80 parts by weight of clay (particle size of 1µm, manufactured by Engelhard Minerals & Chemicals Co.), 0.5 part by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) and 0.7 part by weight of low molecular weight antistatic agent ("PHOSPHANOL RL-210" (trade name has been changed from SM-1), manufactured by Toho Chemical Industry Co., Ltd.) (Because the low molecular weight antistatic agent "RESISTAT PE132" (trade name) used in Example 12 of U.S. Patent 4,318,950 is not available because of retirement, the

low molecular weight antistatic agent used in Example 1 of U.S. Patent 4,318,950 was used.) was melt kneaded with two extruders set at 250°C separately, extruded from the die into a film on both surfaces of the machine-directionally stretched film and then laminated (B/A/B) to form a laminate (paper-like layer/base layer/paper-like layer).

This three-layer film (B/A/B) was introduced into a tenter oven, heated to 165°C, stretched in the transverse direction 7 times with a tenter stretching machine at a temperature of 160°C and then heat-set at a temperature of 140°C. Subsequently, the stretched film was treated with 70 W/m² min. corona discharge on the side of the paper-like layer (layer B), cooled to a temperature of 55°C, and trimmed. The thickness of the three layer stretched film was 140µm and the thicknesses of the individual layers ((B)(A)(B)) of the three layer stretched film were 50µm/40µm/ 50µm. The thus obtained synthetic film is a composite film containing biaxially stretched base layer and two uniaxially stretched paper-like layers (surface layers).

B. Experiment 2

The same procedure as in Experiment 1 was performed except that the corona discharge was omitted.

C. Experiment 3

The same procedure as in Experiment 1 was performed except that the paper-like layer was not formed as the back surface layer (only two layers, A/B, present).

D. Experiment 4

The same procedure as in Experiment 1 was performed except that the base layer and the paper-like layer as the back surface layer were not formed (only one layer, B, present).

E. Experiment 5

The same procedure as in Example 1 of the present application was performed.

F. Experiment 6

The same procedure as in Experiment 1 was performed except that the paper-like layer was not formed as the back surface layer (only two layers, A/B, present).

G. Experiment 7

The same procedure as in Experiment 5 was performed except that the base layer and the paper-like layer as the back surface layer were not formed, and that the thickness of the paper-like layer as the front surface layer was changed to 50 μ m (the reason why the thickness was changed is that it was difficult to obtain a 1 layer film having a thickness of 20 μ m and having the composition of the paper-like layer as described in Experiment 5).

H. Experiment 8

The same procedure as in Experiment 1 was performed except that the base layer and the paper-like layer each had the composition described in Table 1 below (the compositions of Experiments 1-8 are presented in Table 1).

3. Evaluation of Experiments 1-8

According to the evaluation methods of synthetic papers of the present invention, (1) surface resistivities of the synthetic papers before and after washing with water and (2) ink adhesion and suitability for paper feeding/discharge as the offset printability, were evaluated. The thus obtained results are shown in Table 2 below.

(1) Surface Resistivity

The surface resistivity of the synthetic paper (containing 0.7 part by weight of low molecular weight antistatic agent) of each of Experiments 1 to 4 was $2 \times 10^{13} \Omega$ before washing with water (a), which was somewhat improved, but was $1 \times 10^{10} \Omega$ after washing with water, which deteriorated.

Resistivity of the synthetic paper of each of Experiments 5 to 7 did not change as compared with that of Example 1 of the present application.

The surface resistivity of the synthetic paper (containing 40 % by weight (66.7 parts by weight based on the resin components) of polyetheresteramide) of Experiment 8 was $6 \times 10^{12} \Omega$ before washing with water (a), which was somewhat improved, and was $6 \times 10^{12} \Omega$ after washing with water, which was unchanged. Because

a large amount of polyetherestermide was added, polyetheresteramide was insufficiently dispersed, so surface resistivities of 10^{10} to $10^{11} \Omega$ as described in the Examples of the present application could not be obtained.

(2) Offset Printability

Referring to the symbols on page 5 of the second Supplemental Declaration, the ink adhesion on the synthetic paper of each of Experiments 1, 3, and 4 was Δ , and the suitability for paper feeding/discharge was X because of high surface resistivity.

The ink adhesion on the synthetic paper of Experiment 2 was X, and the suitability for paper feeding/discharge was X because of high surface resistivity.

The ink adhesion and suitability for paper feeding/discharge of synthetic paper of each of Experiments 5 to 7 were similar to those of Example 1 of the present application.

The ink adhesion on the synthetic paper of Experiment 8 was Δ , and the suitability for paper feeding discharge was Δ .

| Components: base Layer | | | | | | | |
|------------------------------|---|-------|-------------|-------|-------------------|-------|------------------|
| | Resin | Parts | Filler | Parts | Anti-static Agent | Parts | Dispersing Agent |
| Ex. 1 to Ex. 3 | PP ^{*1} | 80 | Kiesel-Guhr | 0.5 | | | NYMEEN S-210 |
| | Polyamide ^{*3} | 20 | | | | | |
| Ex. 4 | No base layer | | | | | | |
| Ex. 5 and Ex. 6 | The composition of Example 1 of the present application | | | | | | |
| Ex. 7 | No base layer | | | | | | |
| Ex. 8 | PP ^{*1} | 80 | Kiesel-Guhr | 0.5 | | | NYMEEN S-210 |
| | Polyamide ^{*3} | 20 | | | | | |
| Components: Paper Like Layer | | | | | | | |
| | Resin | Parts | Filler | Parts | Anti-static Agent | Parts | Dispersing Agent |
| Ex. 1 to Ex. 4 | PP ^{*2} | 80 | Clay | 80 | PHOSPANOL SM-1 | 0.7 | NYMEEN S-210 |
| | Polyamide ^{*3} | 20 | | | | | |
| Ex. 5 to Ex. 7 | The composition of Example 1 of the present application | | | | | | |
| Ex. 8 | PP ^{*2} | 80 | Clay | 80 | PEEA | 86.7 | NYMEEN S-210 |
| | Polyamide ^{*3} | 20 | | | | | |

TABLE 1

PP*1: Polypropylene, "Novatec PP, MA-8" (trade name, melting point of 164°C). Manufactured by Japan Polychem Corp.

PP*2: Polypropylene, "Novatec PP, MA-3" (trade name, melting point of 165°C). Manufactured by Japan Polychem Corp.

Polyamide*3: Nylon 6, "UBE Nylon 1022FDX23" (trade name),
Manufactured by UBE Industries, Ltd.

PHOSPHANOL SM-1: "PHOSPHANOL RL-210" (trade name has been changed), manufactures by Toho chemical Industry Co., Ltd.

NYMEEN S-210: manufactured by NOF Corp.

PEEA: polyetheresteramide of Production Example 1 of the present application.

| | Molding/Stretching/Surface Treatment | | | | | Evaluation | | | |
|-------|--------------------------------------|-----------------------------|------------------|-------------------|----------------------------------|--------------------|---------------------|--|--|
| | Thickness | Stretching of Surface Layer | | Surface Treatment | Surface Resistivity (Ω) | | Offset Printability | | |
| | | Uni- or Biaxial Stretching | Stretching Ratio | | (A) | (B) | Ink Adhesion | Suitability for Paper Feeding/dischage | |
| Ex. 1 | 50/40/50 | Uniaxially | 7 | Corona | 2×10^{13} | 1×10^{16} | Δ | x | |
| Ex. 2 | 50/40/50 | Uniaxially | 7 | None | 2×10^{13} | 1×10^{16} | x | x | |
| Ex. 3 | 50/40 | Uniaxially | 7 | Corona | 2×10^{13} | 1×10^{16} | Δ | x | |
| Ex. 4 | 50 | Uniaxially | 7 | Corona | 2×10^{13} | 1×10^{16} | Δ | x | |
| Ex. 5 | 20/50/20 | Uniaxially | 8 | Corona | 4×10^{11} | 3×10^{11} | \odot | \odot | |
| Ex. 6 | 20/50 | Uniaxially | 8 | Corona | 4×10^{11} | 3×10^{11} | \odot | \odot | |
| Ex. 7 | 50 | Uniaxially | 8 | Corona | 4×10^{11} | 3×10^{11} | \odot | \odot | |
| Ex. 8 | 50/40/50 | Uniaxially | 7 | Corona | 6×10^{12} | 6×10^{12} | Δ | Δ | |

TABLE 2

4. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

May 19, 2003
Date

Masaaki Yamagata
Masaaki Yamagata

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